

REMARKS

By this amendment, claims 1, 5, 6 and 8 are amended, claims 2-4, 7 and 9-12 are cancelled, and new claims 13-18 are added. Support for new claim 13 is found, *inter alia*, at page 15, line 29-page 16, line 6 of the specification. Support for new claims 14 and 15 is found, respectively, at page 24, lines 9-20 and at page 29, lines 15-20 of the specification. Support for new claim 16 is found at page 11, lines 9-14 of the specification. Support for new claims 17 and 18 is found at page 12, lines 11-20 of the specification. Claims 1, 5, 6, 8 and 13-18 are presented for further examination.

Initially, the specification has been amended to correct minor typographical errors therein. For example, each occurrence of "silicone" has been properly rewritten "silicon." Also, on page 16, line 3, the term "gate insulator" has been replaced with the term "gate electrode" to properly refer to gate electrode 13 in Figure 1(a). Finally, Applicants note that in the currently amended paragraph beginning at page 5, line 14, the names of various journal articles were underlined in the originally filed specification. For consistency with the remainder of the specification, the underlined format of these journal article names has been carried through into the currently amended paragraph where only the previously misspelled name of the author "Johnson" is being corrected.

Claim 1 has been amended to recite that a high dielectric constant film is formed using a process gas comprising oxygen gas, a rare gas, and a gas comprising an organic source, and that the plasma has an electron temperature of 2 eV or less and an electron density of $1 \times 10^{11}/\text{cm}^3$ or more. For consistency with claim 1, claims 5 and 6 have each been amended to recite that a high dielectric constant film is formed. Support for the changes to claims 1, 5 and 6 is found, *inter alia*, in original claims 2, 7 and 11, and at page 11, lines 4-14 of the specification. Support for the changes to claim 8, which recites that the high

dielectric constant film is formed at a temperature of 250 to 500°C, is found, *inter alia*, at page 12, lines 21-31 of the specification.

Reconsideration of the objection to claim 6 is respectfully requested. The term "filmforming" has been deleted. No additional correction is believed necessary.

The rejection of claims 1-5, 9, 10 and 12 under 35 U.S.C. § 102(b) over Murakawa (JP 2000-294550) is respectfully traversed.¹

Claim 1 recites, in pertinent part, forming a high dielectric constant film using plasma in the presence of a process gas comprising an oxygen gas, a rare gas, and a gas comprising an organic source. By using a high density, low electron temperature plasma generated using microwave irradiation via a plane antenna member, a high oxygen radical density is provided to combust the carbon content in the organic source, even at relatively low temperatures (see, e.g., specification at page 7, lines 5-18 and page 26, lines 27-37).

Murakawa discloses forming a plasma containing oxygen and/or nitrogen to form an oxide, nitride or oxynitride film (see abstract). Further, the process gas of Murakawa can contain, for example, hydrogen gas, xenon gas, ammonia gas, or silane gas (see, e.g., paragraphs 23, 66, 76, 80 and 81). However, in contrast to the claimed process, Murakawa does not disclose using a gas comprising an organic source. Further, Murakawa does not disclose using plasma having an electron temperature of 2 eV or less and an electron density of $1 \times 10^{11}/\text{cm}^3$ or more. Because Murakawa fails to teach or suggest all the elements of the claim, Murakawa clearly fails to anticipate or render obvious the claimed subject matter. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

The rejection of claims 6, 7 and 11 under 35 U.S.C. § 103(a) over Murakawa in view of Suzuki (US 6,497,783) is respectfully traversed.²

¹ The rejection as to claims 2-4, 9, 10 and 12 has been rendered moot by the cancellation of these claims.

² The rejection as to claims 7 and 11 has been rendered moot by the cancellation of these claims.

Claim 6 relates to the formation of a high dielectric constant film comprising a substance such as Ta₂O₅, ZrO₂, HfO₂, Al₂O₃, La₂O₃, TiO₂, Y₂O₃, BST, Pr₂O₃, Gd₂O₃, or CeO₂, as well as compounds of these substances. Pointedly, the high dielectric constant film is formed using plasma based on microwave irradiation via a plane antenna member having a plurality of slits using a process gas comprising oxygen gas, a rare gas, and a gas comprising an organic source. The plasma has an electron temperature of 2 eV or less and an electron density of $1 \times 10^{11}/\text{cm}^3$ or more. Further, by this amendment, the silicon-based compounds (SiO₂ and Si₃N₄) have been deleted from claim 6.

As acknowledged in the Office Action, Murakawa fails to disclose the claimed substances. Further, Murakawa fails to disclose that the process gas comprises an organic source and that the plasma has an electron temperature of 2 eV or less and an electron density of $1 \times 10^{11}/\text{cm}^3$ or more.

Suzuki fails to remedy the deficiencies of Murakawa. Suzuki discloses a CVD process for the formation of an insulating film. However, Suzuki does not disclose forming a high dielectric constant film using an organic source. Suzuki discloses only organic silanes for forming a thin film based on a Si compound such as silicon nitride or silicon oxide (see column 14, lines 18-46). Because the formation of a high dielectric constant film using oxygen gas, a rare gas, and a gas comprising an organic source is not reasonably taught or suggested by the cited references, claim 6 is deemed patentable. Withdrawal and reconsideration of the rejection are respectfully requested.

The rejection of claim 8 under 35 U.S.C. § 103(a) over Murakawa in view of Suzuki, and further in view of Cheung (US 6,660,656) is respectfully traversed.

Claim 8 relates to a process for producing an electronic device material wherein a high dielectric constant film has a carbon concentration of 15% or less. Cheung, which was cited for teaching an insulating film having a low (less than 10%) carbon concentration, discloses only a method for depositing a low dielectric constant film (see, e.g., title and abstract of Cheung). Further, because low


dielectric constant films and high dielectric constant films are fundamentally distinct, it would not have been obvious to form a high dielectric constant film having the carbon concentration of Cheung's low dielectric constant films. Because none of the cited references disclose or suggest a high dielectric constant film having a carbon concentration of 15% or less, claim 8 is deemed patentable. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned at (202) 624-2995 would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #101249.55457US).

Respectfully submitted,

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